

## Claims

- [c1] 1. A touching panel apparatus with optical detection for location, comprising:
  - a touching panel;
  - at least a touching object;
  - a border at a periphery of the touching panel with a setting pattern;
  - at least two photographing units, located at two locations of the border, so as to photograph the touching object and the border on the touching panel; and
  - an analysis unit, used to receive and analyze a photographing data from the least two photographing units, and obtain a position of the touching object on the panel after analysis.
- [c2] 2. The touch panel apparatus of claim 1, wherein the setting pattern of the border includes one selected from the group consisting of a set of strips with the same color but different shade degree in alternating change, a set of alternating color strips, a set of strips parallel to the touch panel with different color, a set of strips parallel to the touch panel with same color different shade degree, and a single setting color.
- [c3] 3. The touch panel apparatus of claim 1, wherein the setting pattern of the border include a set of dense strips, which can also be used by the at least two photographic units to make a correction, and the correction comprises an angle correction.
- [c4] 4. The touch panel apparatus of claim 1, wherein the border includes a color light transparent material, so as to have a structure selected from the group consisting of a pattern with full a color light transparent region and a pattern composed of a color light transparent region and a light oblique region.
- [c5] 5. The touch panel apparatus of claim 4, wherein the light oblique region is a dark region and the color light transparent region is a bright region.
- [c6] 6. The touch panel apparatus of claim 1, wherein the border comprises at least one reflection region, so as to enhance the brightness of the setting pattern.
- [c7] 7. The touch panel apparatus of claim 1, wherein the photographic units includes a photosensing cell array, which comprises a plurality of photosensing

lines, wherein the photosensing lines of the photosensing array are operated together to increase the detecting sensibility and precision for the touching object.

[c8] 8. A touching panel apparatus with optical detection for location, comprising:  
a touching panel;  
at least a touching object;  
a border at a periphery of the touching panel with a setting pattern, which has a structure for enhancing light intensity;  
at least two photographing units, located at two locations of the border, so as to photograph the touching object and the border on the touching panel; and  
an analysis unit, used to receive and analyze a photographing data from the least two photographing units, and obtain a position of the touching object on the panel after analysis.

[c9] 9. The touch panel apparatus of claim 8, wherein the setting pattern of the border includes one selected from the group consisting of a set of strips with the same color but different shade degree in alternating change, a set of alternating color strips, a set of strips parallel to the touch panel with different color, a set of strips parallel to the touch panel with same color different shade degree, and a single setting color.

[c10] 10. The touch panel apparatus of claim 8, wherein each one of the at least two photographic units comprises a photosensing cell array, wherein the photosensing cell array can includes a region, which has an optical gain different from that of the other region of the photosensing cell array.

[c11] 11. The touch panel apparatus of claim 8, wherein the border includes a color light transparent material, so as to have a structure selected from the group consisting of a pattern with full a color light transparent region and a pattern composed of a color light transparent region and a light oblique region.

[c12] 12. A touching panel apparatus with optical detection for location, comprising:  
a touching panel;  
a touching object, having a setting pattern structure with a light enhance

structure;

a border optionally included and located at a periphery of the touching panel with a setting pattern;

at least one photographing units, located at a location of the touching panel, so as to photograph the touching object and the setting pattern of the optional border; and

an analysis unit, used to receive and analyze a photographing data from the least one photographing units, and obtain a position of the touching object on the panel after analysis.

[c13] 13. The touch panel apparatus of claim 12, wherein the setting pattern structure of the touching object includes one selected from the group consisting of a set of strips with the same color but different shade degree in alternating change, a set of alternating color strips, a set of strips parallel to the touch panel with different color, a set of strips parallel to the touch panel with same color different shade degree, and a single setting color.

[c14] 14. A touching panel apparatus with optical detection for location, suitable for use on a panel, so as to obtain a touching position on the panel, comprising:  
at least one touching object;  
at least one planar photographic unit, respectively implemented at a place of the apparatus, so as to photograph a detected plane by a slant angle, wherein the at least one planar photographic unit has multiple row lines and multiple column lines in crossing to form a coordinate plane for photographing at least one plane over the panel, and photograph the at least one touching object, and then export a first video information signal;  
at least one planar light source to form an illuminating plane, which is close and substantially parallel to a surface of the panel, so as to illuminate the at least one touching object;  
optionally including at least one line-type photographic unit, located at a place of the apparatus, wherein the line-type photographic unit photographs and detects a plane, which is close and substantially parallel to the panel, and the touching object, and exports a second video information signal; and  
a signal analysis unit, receiving the first video information signal exported by

the at least one planar photograph unit and optionally the second video information signal exported by the at least one line-type photograph unit, so as to obtain a panel position of the at least one touching object on the surface of the panel.

[c15]

15. A location detection apparatus, suitable for use on a panel, so as to obtain a touching position on the panel, comprising:  
at least one touching object;  
at least one planar movable touching member, disposed on the panel;  
at least one planar photographic unit, respectively implemented at a place of the apparatus with a height from the panel, wherein the at least one planar photographic unit has multiple row lines and multiple column lines in crossing to form a coordinate plane, so as to photograph at least one plane over the panel by a slant angle, and photograph the at least one touching object and the at least one planar movable touching member, and then export a first video information signal;  
optionally including at least one line-type photographic unit, located at a place of the apparatus, wherein the line-type photographic unit photographs and detects a plane, which is close and substantially parallel to the panel and the touching object, and exports a second video information signal;  
optionally including a light source to form an illuminating plane, which is close and substantially parallel to a surface of the panel, so as to illuminate the at least one touching object, wherein when the at least one touching object touches to the at least one planar movable touching member, the light source is reflected by the at least one touching object, so as to detect the least one touching object in auxiliary; and  
a signal analysis unit, receiving the first video information signal exported by the at least one planar photograph unit so as to obtain a panel position of the at least one touching object on the surface of the panel, and a panel position of the at least one planar movable touching member on the panel,  
wherein the signal analysis unit also can optionally receives the second video information signal exported by the at least one line-type photograph unit, so as to analyze the panel position of the at least one touching object on the surface

of the panel in auxiliary.

[c16] 16. The apparatus of claim 15, wherein while the signal analysis unit detects the panel position of the at least one touching object and the panel position of the at least one planar movable touching member on the panel, the at least one planar movable touching member includes a being-written object and the at least one touching object includes a writing object.

[c17] 17. The apparatus of claim 15, wherein when the at least one touching object moves and touches the at least one planar movable touching member, the planar photographic unit and the line-type photographic unit simultaneously detect a relative position between the at least one planar movable touching member and the at least one touching object.

[c18] 18. The apparatus of claim 15, wherein the at least one planar movable touching member includes a setting discerning indication in a direction, and can be discerned by the signal analysis unit according to a discerning information stored therein.

[c19] 19. The apparatus of claim 16, wherein the setting discerning indication of the at least one planar movable touching member includes a square/rectangular shape.

[c20] 20. A movable location detection apparatus, suitable for use on a panel, so as to obtain a touching position on the panel, the apparatus comprising:  
a display screen;  
at least one touching object; and  
an optical location detection unit, which photograph a plane of the panel and the at least one touching object by a slant angle, wherein the plane has a touching detection region to form a virtual touching panel,  
wherein the optical location detection unit can detect a (X,Y) coordinate on the virtual touching panel when the at least one touching object touch on the virtual touching panel, wherein the optical location detection unit also exports a signal to control the displayed pattern on the display screen to have a motion.

[c21] 21. The apparatus of claim 20, wherein the virtual touching panel comprises

one selected from the group consisting of (1) a region defined by a square/rectangular pattern projected on the panel, (2) a region in a direction defined by two indication marks projected on the panel, (3) a region defined, in a relative position, from a directional pattern projected on the panel.

[c22] 22. The apparatus of claim 20, wherein the virtual touching panel comprises one selected from the group consisting of (1) a region defined from the apparatus in a relative position, (2) a region defined by a covering region by a movable directional object, (3) a region defined between the apparatus and a movable and directional marking object.

[c23] 23. An optical location detecting apparatus, comprising:  
a touching panel;  
at least one touching object;  
at least one photographic unit, to photograph the touching panel and the at least one touching object;  
a control unit;  
a light source, the light source optionally capable of illuminating different colors in alternative way, wherein an illumination direction of the light source deviated by an angle from the at least one photographic unit, so that the at least one photographic unit does not directly detect a reflected light of the light source from the touching panel, wherein when the at least one touching object intersects the light source, a reflection light by the light source is generated, and the at least one photographic unit can detect the reflection light and export a signal; and  
a control unit, used to receive the signal exported by the at least one photographic unit and analyze out the touching point through discerning the reflection light,  
wherein the apparatus optionally can take a background image information at an initial stage and store in the control unit for later use of comparison in analysis.

[c24] 24. The apparatus of claim 23, wherein a location for the at least one photographic unit is to have a detection plane that is close and substantially

parallel to the touching panel.

[c25] 25. A location detection apparatus, suitable for use on a panel, comprising:  
at least one touching object having a tip region, wherein the tip region is used to touch on the panel;  
a light emitting unit, implemented on the tip region;  
a touching button, implemented on the tip region, wherein the touching button can be switched on by touching, so as to activate the light emitting unit to emit an optical signal;  
at least one photographic unit, respectively located at a place of the apparatus, wherein at least one photographic unit photographs the panel by a slant angle, wherein the at least one photographic unit has multiple row lines and multiple column lines in crossing to form a coordinate plane, so as to photograph at least one plane over the panel, and photograph the optical signal emitted by the at least one touching object, and then export a video information signal; and  
a signal analysis unit, receiving the video information signal, so as to analyze out one point from the light emitting unit to determine the touching position of the at least one touching object on the panel.

[c26] 26. The apparatus of claim 25, wherein in the signal analysis unit, the one point from the light emitting unit is a least point to the at least one photographic unit, so as to determine the touching position of the at least one touching object, wherein the least point is determined by a principle:  
according to the analysis of the video information signal, when the touching object touches the panel, the light emitting unit has a plurality of detection points being detected, and the detection points have one detection point in video information with the least distance to the photographic unit is determined as the least point, and the position of the least point is the touching position or a reference position from the touching position.

[c27] 27. A touching panel apparatus with optical detection for location, comprising:  
a touching panel;  
at least one touching object, capable of emitting different colors;  
at least one photographing unit with a photosensing array to detect the

different colors, wherein the at least one photographing unit is located at a location with respect to the touching panel, so as to at least photograph the touching object by a slant angle; and  
an analysis unit, used to receive and analyze a photographing data output from the least one photographing unit, and obtain a position of the touching object on the panel after analysis, wherein the position is determined by a principle of most sensibility position, in which all of the different colors have been separately detected by the at least one photographing unit and the position is determined according to detecting results form each of the different colors by the principle of most sensibility position.